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**REMARKS**

Claims 4, 13, and 55 are currently amended. Claims 1, 3, 5, 9-10, 12, 14, 16-17, 19-24, 26-27, and 56-61 were previously presented. Claim 24 has been rejoined and is labeled previously presented above. Claims 2, 6-8, 11, 15, 18, 25, and 28-54 are canceled. Accordingly, claims 1, 3-5, 9-10, 12-14, 16-17, 19-24, 26-27, and 55-61 are pending examination.

**Objection**

Claim 4 is amended to address the cited informalities.

**Rejection of Claims Under 35 USC §103(a)**

Claims 1, 3-5, 9, 10, 12-14, 16, 17, 19-24, 26, 27, and 55-61 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 5,606,077 (Lersch).

**Lersch Is Non-Analogous Prior Art**

In order "to rely on a reference under 35 USC §103, it must be analogous prior art." See header of MPEP §2141.01(a). Applicant submits that Lersch is non-analogous art.

MPEP §2141.01(a) provides a two-part test for determining whether a piece of prior art is analogous prior art. First, "the reference must ... be in the field of the applicant's endeavor." MPEP §2141.01(a) also cites *Wang Laboratories, Inc. vs. Toshiba Corporation*, 993 F.2d 858, 26 U.S.P.Q. 2d 1767 (Fed. Cir., 1993). Applicant's field of endeavor is batteries (see Background) while Lersch's field of endeavor could be characterized as additives for dispersion paints or lacquers (see Abstract and C5, L51-52); or could be characterized as coatings for the surfaces of pigments and fillers (see Abstract and C5, L51-52); or as polymer synthesis (see Abstract and Title). In any of these cases, Lersch's field of endeavor could NOT be characterized as batteries. As a result, Lersch fails the first part of the test.

MPEP §2141.01(a) sets forth the second part of the two-part inquiry when it states that if the reference is not in Applicant's field of endeavor, it must "be reasonably pertinent to the particular problem with which the inventor was concerned." Further, a "reference is reasonably pertinent if ... it ... logically would have commended itself to an inventor's

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attention in considering his problem." See MPEP §2141.01(a) citing to *Wang Laboratories Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed. Cir. 1993).

The "particular problem" addressed by the claimed invention is easily identified from the Background of the specification. The last two sentences of the Background state the following:

... polysiloxane based electrolytes typically have a low ionic conductivity that limits their use to applications that do not require high rate performance. As a result, there is a need for polysiloxane-based electrolytes with an increased ionic conductivity.

As a result, the inventors are addressing the problem of low ionic conductivity in polysiloxane-based electrolytes. However, since Lersch does not even teach using the disclosed polysiloxanes in the electrolyte of an electrochemical device, Lersch does not suggest that Lersch's polysiloxanes would increase the ionic conductivity of such an electrolyte. As a result, the inventors would not have consulted Lersch in order to solve their problem.

Because Lersch is both from a different field of endeavor and is not reasonably pertinent to the Applicant's problem, Lersch fails both parts of the MPEP §2141.01(a) analogous art test. Because Lersch is not analogous prior art, Lersch is not available for use in a rejection of these claims under 35 USC §103 and the rejections should be withdrawn.

#### **Lersch Does Not Teach of Suggest Every Element of the Claims**

There is nothing in Lersch that teaches or suggests including Lersch's polysiloxane in the electrolyte of an electrochemical device. The Office Action notes that Lersch states that the "siloxanes ... can also be used as new polymeric materials for optical and electronic applications." However, teaching that Lersch's polysiloxane can be used for "electronic applications" does not suggest using them in the electrolyte of an electrochemical device. For instance, even if the Applicant accepted that the claimed electrochemical device was an "electronic application" as cited in Lersch, this phrase still does not suggest that the polysiloxane be used in an electrolyte of the "electronic application." As a result, it cannot be argued that this phrase suggests including Lersch's polysiloxane in the electrolyte of an electrochemical device. For this reason alone, the pending claims are patentable over Lersch.

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**Further Prosecution**

For the purposes of further prosecution, the Applicant attaches copies or printouts of the following publicly available documents. At this time, the Applicant makes no representation regarding the contents of these documents.

1. "electrochemical." *Websters New World College Dictionary*. 4th ed. 2006, pp 458.
2. Definition of electrochemistry, first page printed from  
<http://en.wikipedia.org/wiki/Electrochemical> on March 20, 2008.
3. First page printed from  
<http://www.kmle.com/search.php?Search=electrochemical&DictDefAll=YES&DictLinkAll=YES&DictAbbreviationAll=YES&DictEngAll=YES&WebDef=YES&HTMLWebHtdig=YES> on March 20, 2008.
4. Zumdahl, Steven S., Chemistry, D.C. Heath and Company, 1986, pp. 715.
5. "electronics." *Websters New World College Dictionary*. 4th ed. 2006, pp 459w.
6. Definition of electronic printed from <http://dictionary.reference.com/browse/electronic> on March 20, 2008.

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**CONCLUSION**

The Examiner is encouraged to telephone the undersigned with any questions.

Respectfully submitted,



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# Electrochemistry

From Wikipedia, the free encyclopedia  
(Redirected from Electrochemical)

Electrochemistry is a branch of chemistry that studies chemical reactions which take place in a solution at the interface of an electron conductor (the electrode, composed of a metal or a semiconductor) and an ionic conductor (the electrolyte), and which involve electron transfer between the electrode and the electrolyte or species in solution.

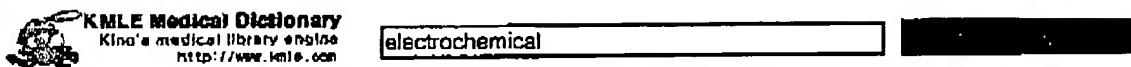
If a chemical reaction is driven by an external applied voltage, as in electrolysis, or if a voltage is created by a chemical reaction, as in a battery, it is an *electrochemical* reaction. Chemical reactions where electrons are transferred between molecules are called oxidation/reduction (redox) reactions. In general, electrochemistry deals with situations where oxidation and reduction reactions are separated in space or time, connected by an external electric circuit to understand each process.



English chemists John Daniell (left) and Michael Faraday (right), both credited as founders of electrochemistry today.

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[e-lec-tro-chem-i-cal \(ɪ-lek'trə-kem'ɪ-kəl\)](#)

electrochemical:

adj.

Of or relating to chemical reactions brought about by electricity; galvanoochemical.

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## CHAPTER SEVENTEEN

# Electrochemistry

## CONTENTS

**E**lectrochemistry is an important component of a general chemistry course since it is one of the most important interfaces between chemistry and everyday life. Every time you start your car, turn on your calculator, look at your digital watch, or listen to a radio at the beach, you are depending on electrochemical reactions. Our society sometimes seems to run almost entirely on batteries. Certainly the advent of small, dependable batteries along with silicon-chip technology has made possible the tiny calculators, tape recorders, and clocks that we take for granted.

Electrochemistry is important in other less obvious ways. For example, the corrosion of iron, which has tremendous economic implications, is an electrochemical process. In addition, many important industrial materials such as aluminum, chlorine, and sodium hydroxide are prepared by electrolytic processes. In analytical chemistry, electrochemical techniques employ electrodes that are specific for a given molecule or ion, such as  $H^+$  (pH meters),  $F^-$ ,  $Cl^-$ , and many others. These increasingly important methods are used to analyze for trace pollutants in natural waters or for the tiny quantities of chemicals in human blood that may signal the development of a specific disease.

**Electrochemistry** is best defined as the study of the interchange of chemical and electrical energy. It is primarily concerned with two processes that involve oxidation-reduction reactions: the generation of an electric current from a chemical reaction, and the opposite process, the use of a current to produce chemical change.

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of electric energy that girdles the earth in the ionosphere above the magnetic equator and near the auroral displays

**electro-ki-net-ics** (ə lek'trō ki'net'iks, ə -trō-) *n.* the branch of electrodynamics dealing with electricity in motion, or electric currents: cf. ELECTROSTATICS

**electro-ki-net-ic** (ə lek'trō ki'net'ik, ə -trō-) *n.* a practitioner of ELECTROLYSIS (sense 2)

**electro-lu-mines-cence** (ə lek'trō lu'mi nəs'ens, ə -trō-) *n.* the emission of cold light by certain substances when acted upon by an alternating electric field — *electro-lu-mines-cent* *adj.*

**elec-tro-ly-sis** (ə lek'trō lī'sis, ə -trō-) *n.* [ELECTRO- + -LYSIS] 1 the decomposition of an electrolyte by the action of an electric current passing through it. 2 the removal of unwanted hair from the body by destroying the hair roots with an electrified needle

**electro-lyte** (ə lek'trō lī't, ə -trō-) *n.* [ELECTRO- + -LYTE] any chemical compound that ionizes when molten or in solution, allowing it to conduct electricity

**electro-lytic** (ə lek'trō lī'tik, ə -trō-) *adj.* 1 of or produced by electrolysis 2 of or containing an electrolyte — *electro-lyt-i-cally* *adv.*

**electro-lyze** (ə lek'trō līz, ə -trō-) *vt.* *-lyzed*, *-lyz-ing* to subject to, or decompose by, electrolysis

**electro-magnet** (ə lek'trō māg'nit, ə -trō-) *n.* a soft iron or steel core surrounded by a coil of wire, that temporarily becomes a magnet when an electric current flows through the wire

**electro-magnetic** (ə lek'trō māg'nik, ə -trō-) *adj.* of, produced by, or having to do with electromagnetism or an electromagnet — *electro-magneti-cally* *adv.*

**electromagnetic interaction** (or **forceful Particle Physics**) the relatively long-range interaction between elementary particles resulting from their electric and magnetic fields, responsible for molecular structure, chemical reactions, and other electromagnetic phenomena: see STRONG INTERACTION, WEAK INTERACTION

**electromagnetic spectrum** the complete range of frequencies of electromagnetic waves from the lowest to the highest, including, in order, radio, infrared, visible light, ultraviolet, X-ray, and gamma-ray waves

**electromagnetic wave** a wave propagated through space or matter by oscillating electric and magnetic fields, in a vacuum it travels at the speed of light

**electro-mag-net-ism** (ə mag'ni tiz'm) *n.* 1 magnetism produced by an electric current. 2 *ø* the interaction between a magnetic field and an electric field. 3 *ø* the phenomena produced by such an interaction. 3 is the branch of physics that deals with electricity and magnetism

**electro-mechani-cal** (ə me'kān'ik' kāl) *adj.* designating or of a mechanical device or operation that is activated or regulated by electricity

**electro-met-al-urgy** (ə met'äl'jūr'jē) *n.* the branch of metallurgy having to do with the use of electricity, as for producing heat in smelting, refining, etc., or for refining, plating, or depositing metals by electrolysis

**electro-met-er** (ə lek'trō mēt'ər, ə -trō-) *n.* 1 a device for detecting or measuring differences of potential by means of electrostatic forces. 2 an active circuit arrangement for measuring differences of potential without drawing appreciable current

**electro-mo-tive** (ə lek'trō mō'tiv, ə -trō-) *adj.* 1 producing an electric current through differences in potential. 2 relating to electromotive force

**electromotive force** the force or electric pressure that causes or tends to cause a current to flow in a circuit, equivalent to the potential difference between the terminals and commonly measured in volts: abbrev. *E*, *EMF*, or *emf*

**electro-my-o-graph** (ə mī'ō grāf, ə -mī'ō-) *n.* an instrument that displays and records a graphic tracing (electromyogram) of the minute voltage changes in muscle tissue, used in the diagnosis of muscle and nerve disorders; the tracing is made audible by connecting the voltage to a speaker — *electro-my-o-graphic* *adj.* — *electro-my-o-graphy* (ə mī'ō grāf'ē) *n.*

**elec-trōn** (ə lek'trōn, ə -trōn) *n.* [coined (1891) by G. J. Stoney '1838-1911, Irish physicist < ELECTRIC + -ON] *Particle Physics* the lightest elementary particle with an electric charge, it is a lepton with a negative charge of c.  $1.602 \times 10^{-19}$  coulombs and a rest mass of c.  $9.109 \times 10^{-31}$  kg (c. 0.511 MeV/c $^2$ ), which is c.  $1/1836$  of the mass of a proton; ordinarily an atom has the same number of negative electrons around the nucleus as the number of positive protons in the nucleus: see also POSITRON, NEGATRON

**electro-nega-tive** (ə lek'trō neg'ē tiv, ə -trō-) *adj.* 1 having a negative electrical charge; tending to move to the positive electrode, or anode, in electrolysis. 2 having the ability to attract electrons, esp. in forming a chemical bond — *n.* an electronegative substance

**electron gun** the part of an electron tube, esp. a cathode-ray tube, that emits, accelerates, and controls a beam of electrons

**elec-trōnic** (ə lek'trōn'ik, ə -trōn'ik) *adj.* 1 of or having to do with electrons. 2 operating, produced, or done by the action of electrons or other carriers in semiconductors, vacuum tubes, etc. 3 carried on by or making use of electronic equipment /electronic banking, electronic journalism/ — *elec-trōn-i-cally* *adv.*

**electronic mail** (ə lek'trōn'ik māl) *n.* electronic mail

**electronic music** music in which the sounds are originated, organized, or altered by electronic devices

**electronic organ** a musical instrument with a console like that of a pipe organ, but producing tones by means of electronic devices

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**electrokinetics / electrosurgery**

**electronic publishing** the publishing of information, books, etc. in a format accessible by computer

**electro-ni-ics** (ə lek'trō nī'iks) *n.* the science that deals with the behavior and control of electrons in vacuums and gases, and with the use of electronic tubes, photoelectric cells, transistors, etc. — *pl.n.* electronic equipment, systems, etc.

**electron lens** a configuration of electric or magnetic fields, or a combination of both, that serves to focus or deflect an electron beam, as in an electron microscope

**electron microscope** an instrument that focuses a beam of electrons on an object, using electric or magnetic fields, to form an enlarged image of the object on a fluorescent screen, photographic plate, or cathode-ray tube; *specif.* such an instrument in which the beam of electrons passes directly through an extremely thin object and forms a two-dimensional image; it is much more powerful than any optical microscope: cf. SCANNING ELECTRON MICROSCOPE

**electron multiplier** a device that amplifies a stream of electrons by causing it to strike electrodes at successively higher potentials; secondary electrons produced at each electrode increase the quantity of electrons in the stream

**electron optics** the branch of electronics having to do with the focusing and deflection of beams of electrons by means of electric and magnetic fields, which act upon the beams in the same way that lenses act on light rays

**electron telescop-e** an instrument using a cathode-ray tube to form a visible image of infrared rays brought into focus from a distant object by optical lenses

**electron tube** a sealed tube, usually of glass, containing a vacuum or a gas and electrodes that are connected to pinlike terminals that protrude from the base, used as a plug-in component in an electronic device to control the flow of electrons

**electron volt** a unit of energy equal to that attained by an electron falling unimpeded through a potential difference of one volt:  $1.602 \times 10^{-19}$  joules; abbrev. *eV*; often written *electron-volt* *n.* or *electron-volt*

**electro-optics** (ə lek'trō op'tiks) *n.* the technology that deals with the production, control, and detection of light by electrical devices — *electro-optic* *adj.* or *electro-optical* — *electro-opti-cally* *adv.*

**electro-os-mo-sis** (ə os'mōz'ēs) *n.* *-os'mōz'ēs* osmosis through a membrane that is caused by the action of an electric field, usually such a field generated by two electrodes, one on each side of the membrane — *electro-osmotic* (ə os'mōt'ik) *adj.*

**electro-phile** (ə fil'ik) *adj.* designating or of a chemical ion, etc. that accepts additional electrons

**electro-phi-re-sis** (ə fēr'ēs'is) *n.* [ModL < ELECTRO- + (CATAPHO-RE-SIS) the migration of charged colloidal particles or of molecules through a fluid or gel subjected to an electric field — *elec-tro-phore'tik* (ə fōr'ēt'ik) *adj.*

**electro-pho-re-sis** (ə fōr'ēs'is) *n.* [ModL < ELECTRO- + Gr. *phōre*, bearing < *pherein*. BEAR] an apparatus consisting of an insulated resin disk and a metal plate, used in generating static electricity by induction

**electro-physi-ol-ogy** (ə līf'sēz'ēl'ōjē) *n.* 1 the study of the electrical properties of living cells. 2 the study of the production of electric currents by living organisms — *elec-tro-physi-olog-i-cal* (ə līf'sēz'ēl'ōjēk'āl) *adj.* — *elec-tro-physi-olog-i-cist* *n.*

**electro-plate** (ə lek'trō plāt') *vt.* *-trō-plate*, *-plated*, *-plating* to deposit a coating of metal on by electrolysis

**electro-positive** (ə lek'trō pōz'itiv, ə -trō-) *adj.* 1 having a positive electrical charge; tending to move toward the negative electrode, or cathode, in electrolysis. 2 having the ability to give up electrons, esp. in forming a chemical bond — *n.* an electropositive substance

**electro-scope** (ə lek'trō skōp', ə -trō-) *n.* an instrument for detecting very small charges of electricity, electric fields, or radiation; it can indicate whether they are positive or negative, as by the divergence of electrically charged strips of gold leaf; when fitted with optical means for quantitative observation of the divergence, an electroscope serves as an electrometer — *electro-scop-ic* (ə skōp'ik) *adj.*

**electro-shock therapy** (ə shāk') a form of shock therapy in which electric current is applied to the brain; see also SHOCK THERAPY

**electro-static** (ə lek'trō stat'ik, ə -trō-) *adj.* 1 of or having to do with electrostatics. 2 designating or of a speaker in which electric force is applied to metal plates, causing a diaphragm suspended between them to vibrate — *electro-stat-i-cally* *adv.*

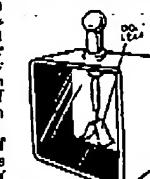
**electrostatic generator** a generator which produces high-voltage electricity by electrostatic induction; sometimes used to accelerate charged particles for nuclear reactions

**electro-stat-i-cs** (ə stat'ikz) *n.* the branch of electromagnetic theory dealing with electric charges at rest, or static electricity: cf. ELECTROKINETICS

**electrostatic units** the system of CGS electric and magnetic units that assigns the value of one to the dielectric constant of a vacuum

**electro-surgery** (ə sur'jērē) *n.* the use of electricity in surgery, esp. in cauterizing

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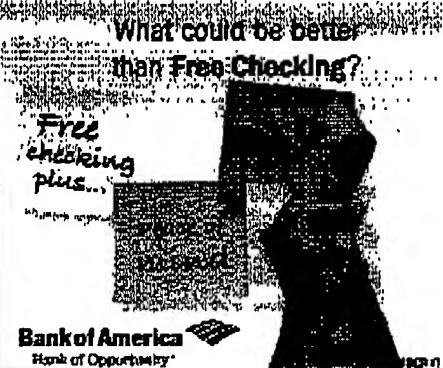
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**e·lec·tron·ic** [i-lek-tron-ik, ee-lek-] [Pronunciation Key](#) - [Show IPA](#)  
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-*adjective*

1. of or pertaining to electronics or to devices, circuits, or systems developed through electronics.
2. of or pertaining to electrons or to an electron.
3. (of a musical instrument) using electric or electronic means to produce or modify the sound.
4. of, pertaining to, or controlled by computers, or computer products and services.

[Origin: 1900-05; ELECTRON + -IC]

-*Related forms*

**e·lec·tron·i·cal·ly, adverb**

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**e·lec·tron·ic** (i-lēk-trōn'ik, ēlēk-) [Pronunciation Key](#)

adj.

1. Of or relating to electrons.
2. Of, based on, operated by, or otherwise involving the controlled conduction of electrons or other charge carriers, especially in a vacuum, gas, or semiconducting material.
3. Of, relating to, or produced by means of electronics: *electronic navigation*; *electronic books*.
4. Of or relating to music produced or altered by electronic means, as by a tape recorder or synthesizer.
5. Of, implemented on, or controlled by a computer or computer network.

**e·lectron'l·cal·ly** *adv.*

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**electronic**

*adjective*

1. of or relating to electronics; concerned with or using devices that operate on principles governing the behavior of electrons: "electronic devices"
2. of or concerned with electrons; "electronic energy"

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**electronic** [ē-lĕk'trō-nik] *adjective*

worked or produced by devices built or made according to the principles of electronics

Example: *an electronic calculator*

*Arabic:* إلكتروني

*Chinese (Simplified):* 电子的

*Chinese (Traditional):* 電子的

*Czech:* elektronický

*Danish:* elektronisk; elektron-

*Dutch:* elektronisch

*Estonian:* elektron-

*Finnish:* elektroninen

*French:* électronique

*Japanese:* 電子の

*Korean:* 전자(공학)의

*Latvian:* elektrónisks

*Lithuanian:* elektroninis

*Norwegian:* elektronisk, elektrón-

*Polish:* elektroniczny

*Portuguese (Brazil):* eletrônico

*Portuguese (Portugal):* electrónico

*Romanian:* electricnic

<i>German:</i> elektronisch	<i>Russian:</i> электронный
<i>Greek:</i> ἡλεκτρονικός	<i>Slovak:</i> elektrónický
<i>Hungarian:</i> elektronikus	<i>Slovenian:</i> elektronski
<i>Icelandic:</i> rafeinda-, rafelindataeknli-, raftæknilegur	<i>Spanish:</i> electrónico
<i>Indonesian:</i> elektronik	<i>Swedish:</i> elektronisk
<i>Italian:</i> elettronico	<i>Turkish:</i> elektronik

**electronic<sup>2</sup>** [elək'trōnɪk] *adjective*  
concerned or working with such machines  
Example: *an electronic engineer*

<i>Arabic:</i> إلكتروني	<i>Japanese:</i> 電子工学の
<i>Chinese (Simplified):</i> 电子学的	<i>Korean:</i> 컴퓨터와 관련된
<i>Chinese (Traditional):</i> 電子學的	<i>Latvian:</i> elektronu-
<i>Czech:</i> elektronický	<i>Lithuanian:</i> elektronikos
<i>Danish:</i> elektronikingeniør; elektronik-	<i>Norwegian:</i> elektrø-
<i>Dutch:</i> elektronisch	<i>Polish:</i> elektronik
<i>Estonian:</i> elektroonika-	<i>Portuguese (Brazil):</i> eletrônico
<i>Finnish:</i> elektroniikka-	<i>Portuguese (Portugal):</i> electrônico
<i>French:</i> électronicien	<i>Romanian:</i> electronist
<i>German:</i> Elektronik-...	<i>Russian:</i> специализирующийся на электронике
<i>Greek:</i> ἡλεκτρονικός	<i>Slovak:</i> elektronický
<i>Hungarian:</i> elektronikai, elektronikus	<i>Slovenian:</i> elektronski
<i>Icelandic:</i> rafeinda-, raftæknli-	<i>Spanish:</i> electrónico
<i>Indonesian:</i> ahli elektronika	<i>Swedish:</i> elektron-, elektronik-
<i>Italian:</i> elettronico	<i>Turkish:</i> elektronik

See also: [electron](#), [electronics](#), [electronic mail](#)

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**electronic**  (i-lĕk'trōnĭk) [Pronunciation Key](#)

Relating to electrical devices that amplify and process electrical signals. Audio amplifiers, radios, and digital circuitry are electronic devices. ◦ The scientific study of the behavior and design of electronic devices and circuits is called **electronics**. Compare [electric](#).

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Main Entry: **elec·tron·ic**

Pronunciation: i-"**lek**'-trān-ik

Function: **adjective**

: of or relating to electrons or electronics — **elec·tron·i·cal·ly** /-i-k (ĕ-) 1E / **adverb**

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**electronic**

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